

Remarks

Claims 1-5 and 7-20 were previously pending in the subject application. By this Amendment, claims 1-5 and 7-20 have been amended. Additionally, the specification has been amended. Support for the amendments can be found throughout the original specification (see, for example; page 3, line 26 through page 5, line 12; page 5, line 23 through page 6, line 2; page 6, lines 13-19; page 11, line 7 through page 13, line 8; and Figure 2-4). Upon entry of this Amendment, claims 1-5 and 7-20 will be before the Examiner for further consideration.

The amendments to the claims have been made in an effort to lend greater clarity to the claimed subject matter and to expedite prosecution. The amendments should not be construed as an indication of the applicants' agreement with, or acquiescence to, the rejections of record. Favorable consideration of the claims now presented, in view of the amendments and remarks set forth herein, is earnestly solicited.

Claims 1, 11, and 19 have been objected to for informalities. By this Amendment, claims 1, 11, and 19 have been amended to replace the transitional phrase "having" with "comprising," as suggested by the Examiner. Also, claim 11 has been amended to remove the extra ")" in line 4. Accordingly, the applicants respectfully request reconsideration and withdrawal of the objection to claims 1, 11, 19.

The specification has been objected to under 35 U.S.C. §132(a) for introducing new matter into the disclosure in the Amendment of September 9, 2009. The Action states that the figures do not show the channel in the form of a polynomial having inflection points. Though the applicants do not necessarily agree with this objection, in an effort to expedite prosecution, the specification has been amended to remove the definition of a turning point including the discussion of inflection points. Accordingly, the applicants respectfully request reconsideration and withdrawal of the objection to the specification under 35 U.S.C. §132(a).

Claims 1-20 have been rejected under 35 U.S.C. §112, first paragraph, as based on a disclosure which is non-enabling. The applicants respectfully request reconsideration.

By this Amendment, claims 1, 11, and 19 have been amended to recite a method of separating molecules comprising the step of directing the molecules through a separating column or a

micro-chromatograph. The currently recited method claims are dependent with the previously recited device claims as process and apparatus used in the practice of the process (MPEP §802.01).

Claims 1, 11, and 19 each recite a method including the positively recited method step of directing molecules through a separation column (claims 1 and 19) or a micro-chromatograph comprising a separation column (claim 11). Thus, there are no elements missing which are critical to the practice of the invention. In each independent claim, certain features of the separation column are defined using the open transition “comprising,” such that other elements may be present in the separation column. That is, in the method of claims 1, 11, and 19, the molecules must be directed through a separation column or a micro-chromatograph comprising a separation column, wherein the separation column must include the features recited in the claim, but may also include additional structural elements.

As discussed above, the methods recited in claims 1, 11, and 19 each include the positively recited method step of directing molecules through a separation column (claims 1 and 19) or a micro-chromatograph comprising a separation column (claim 11). None of these claims is missing any critical method step. Thus, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-20 under 35 U.S.C. §112, first paragraph, as based on a disclosure which is non-enabling.

Claims 1-20 have been rejected under 35 U.S.C. §112, first paragraph, as non-enabled. The applicants respectfully request reconsideration.

The Action indicates that it is unclear how the diameter of the channel can be greater than the path between two turning points. However, the applicants wish to emphasize that this limitation is not recited in the claims (as previously presented or as currently presented). Instead, the claimed invention requires that “the diameter of the channel is greater than the path which an analyte molecule covers through diffusion on its way between two sequential turning points located at the beginning of sequential curves that each have the same curvature” (emphasis added). That is, the diameter of the channel is greater than the path covered by an analyte molecule by diffusion as it travels through the channel from one turning point located at the beginning of a curve to the turning point located at the beginning of the next curve that has the same curvature as the first curve. Since

the curves alternate in curvature, the next curve having the same curvature would not be the very next curve (of any curvature) seen by the analyte molecule, but rather the one after that.

In order to clarify this point, attached hereto the applicants are providing an Illustrative Figure Sheet with Illustrative Figure A and Illustrative Figure B. As seen in Illustrative Figure A, a related art configuration is depicted with an exemplary situation wherein the travel paths of two molecules through a section of a separating column are denoted by a first dotted line and a second dashed line. In this case, the first molecule (dotted line) travels through the first curve on the outer side, then diffuses (in a radial direction) on the straight leg following this first curve completely to the other side of the channel. Consequently, the first molecule travels through the second curve on the outer radius as well. The second molecule (dashed line), in contrast, travels through the first curve on the inner path and diffuses (in a radial direction) on the straight leg following this first curve to the other side of the channel in the same way like the first molecule. Consequently, this second molecule travels through the second curve on the inner path. Following this scenario, the whole travel path of the second molecule is significantly shorter than the travel path of the first molecule. In other words, the second molecule reaches the exit of the second curve significantly earlier than the first molecule. Thus, taken over a specific travel time interval, the second molecule will advance a significantly greater distance through the channel than the first molecule as displayed in the figure.

The subject inventors have recognized this particular problem. While theoretically, this race track effect should be compensated if two curves are provided having a different curvature direction, this is only true if the molecules stay on their travel line and do not show any diffusion in a radial direction across the channel. However, in practice the molecules do not travel only along the channel but do diffuse (in a radial direction) across the channel.

In the subject invention, this problem is addressed by a specific relation of the diameter to the distance traveled by an analyte molecule by diffusion between two sequential turning points at the beginning of curves that each have the same curvature. This is shown in Illustrative Figure B in which the two sequential turning points are located approximately where the vertical lines with the arrows are. Having this geometry, the diffusion of the molecule across the channel (in a radial

direction) does not significantly affect position of the molecules relative to each other. Thus, the spreading of a block of molecules traveling along the channel is significantly reduced and consequently the signal to noise ratio is significantly improved.

Thus, the path which the diameter of the channel must be greater than is the path which an analyte molecule covers through diffusion as it travels between sequential turning points located at the beginning of sequential curves that each have the same curvature. As is understood in the art and described in the subject specification (see, for example; page 4, line 27 through page 5, line 4; discussion of “racetrack effect”), as an analyte molecule travels through a channel in a separation column, the molecule diffuses in a radial direction from one side of the channel toward the diametrically opposite side of the channel (i.e. approximately perpendicular to the direction of the fluid flow). This distance covered by the molecule in a radial direction of the channel, as it moves from one turning point to the next turning point that inflects to the same curvature, is the path which the mean diameter must be greater than.

As the Examiner is aware, “the test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation.” MPEP §2164.01. The applicants submit that a skilled artisan could readily make and use the claimed invention, without undue experimentation, based on the disclosure in the specification.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-20 under §112, first paragraph, as failing to comply with the enablement requirement.

Claims 1-20 have been rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement. The applicants respectfully request reconsideration.

By this Amendment, independent claims 1, 11, and 19 have been amended to recite that the opposing curves comprise turning points where “the flow direction of the fluid stream flowing through the channel changes to the particular other direction.” This language was used in the specification as originally filed. Also, the claims and specification have been amended to remove any recitation of inflection points.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-20 under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement.

Claims 1-20 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite. The applicants respectfully request reconsideration.

By this Amendment, claims 4, 9, 10, and 19 have each been amended to clarify that the channel comprises the legs. This is described at, for example, page 6, lines 13-19 of the original specification. Also, claim 15 has been amended to depend from claim 4, and claim 11 has been amended to recite that the micro-chromatograph comprises a separation column.

Moreover, with regard to the first paragraph of page 6 of the Action, the claims have been amended to recite a method of separating molecules and to clarify the structure of the separation column, as discussed in detail above.

The applicants submit that the claims as currently presented distinctly claim and particularly point out the subject matter regarded as the invention. Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-20 under 35 U.S.C. §112, second paragraph.

Claims 1-20 have been rejected under 35 U.S.C. §102(a) and (b) as being anticipated by Lehmann *et al.* ("A Miniaturised Gas Chromatographic Module on a Credit Card Sized Motherboard," *Sensor Proceedings*, 2003, pages 157-161). The applicants respectfully request reconsideration.

Though the applicants do not agree that the Lehmann *et al.* article anticipates the claimed invention, this issue need not be addressed because Lehmann *et al.* is not available as prior art. Submitted herewith in support are (1) a Certificate of Accuracy from Jenny Hicks of Transperfect Translations, (2) the Declaration of Uwe Lehmann, and (3) the Declaration of Dr. Lars Birken. The applicants respectfully assert that these declarations and the certificate of accuracy perfect the applicants' claim to priority, which predates the October 2003 publication date of the cited reference.

Though paragraphs 1-6 of the Declaration of Uwe Lehmann discuss issues pertaining to a related application, paragraphs 7-9 establish that the earliest possible publication date of the cited

reference (of which Uwe Lehmann is a co-author) was in October, 2003. The priority date to which the subject application is entitled is January 27, 2003. Priority is perfected by virtue of the Declaration of Dr. Birken, which establishes that original German application DE103 03 107.3 filed on January 27, 2003, was identical to International Application PCT/DE2004/000089 filed on January 22, 2004. Upon entering the U.S. National Phase, Dr. Birken instructed the applicants' undersigned firm to obtain an English language translation of PCT/DE2004/000089 as filed. The firm of the undersigned contacted Transperfect Translations to obtain the English language translation, which corresponds to International Publication No. WO2004/068101 A1, the English language translation of which is certified as accurate by Transperfect Translation (Certificate of Accuracy of Jenny Ificks). The firm of the undersigned filed the translation obtained from Transperfect Translations as the subject application. Accordingly, the subject application is a certified accurate English translation of the German applications to which it claims priority. Because the subject application's priority date is nine months before the earliest possible publication date of the cited reference, the cited Lehmann *et al.* reference is not available as prior art.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-20 under 35 U.S.C. §102(a) and (b) based on Lehmann *et al.*

Claims 1-20 have been rejected under 35 U.S.C. §102 as being unpatentable over the "Applicant's Admission of Prior Art" (Fig. 1; and page 10, line 11 – page 11, line 6 of the subject application). The applicants respectfully traverse this ground for rejection.

The claimed method requires that "the diameter of the channel is greater than the path which an analyte molecule covers through diffusion on its way between two sequential turning points located at the beginning of sequential curves that each have the same curvature." In the separation column disclosed at page 10, line 11 through page 11, line 6 and depicted in Figure 1, the channel diameter "is smaller than the path which the analyte molecule covers through diffusion on its way between two turning points 29, 30" (see page 10, line 26 through page 11, line 2; emphasis added). This is in direct contrast to the separation column recited in the claims and leads to defocusing of the analyte package and other problems arising from the "racetrack effect."

The Action indicates at page 8 that this feature is not a structural limitation of the channel.

Though the applicants do not necessarily agree, by this Amendment, the claims have been amended to recite a method of separating molecules. The requirement that “the diameter of the channel is greater than the path which an analyte molecule covers through diffusion on its way between two sequential turning points located at the beginning of sequential curves that each have the same curvature” must be met as a limitation on the method (in addition to being a structural limitation on the channel).

As discussed above and depicted in Illustrative Figures A and B, the applicants have discovered that the measure of only providing curves in alternate directions in a separation column in the practice of a method of separating molecules is not sufficient to significantly decrease the spread of a sample within the column. The applicants have also discovered that inhibiting diffusion of the analyte molecules from one side of the column to the other side can help address this problem. Thus, the subject invention addresses the “racetrack effect” problem by requiring that “the diameter of the channel is greater than the path which an analyte molecule covers through diffusion on its way between two sequential turning points located at the beginning of sequential curves that each have the same curvature.” This particular relation of the geometry of the channel and the diffusion of the molecules across the channel is not shown or suggested in AAPA.

As the Examiner is aware, it is a basic premise of patent law that in order to anticipate, a single reference must disclose within the four corners of the document each and every element and limitation contained in the rejected claim. *Scripps Clinic*, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991). The separation column disclosed in Figure 1 fails to teach certain advantageous elements of the claimed invention.

Accordingly, the applicants respectfully request reconsideration and withdrawal of the rejection based on AAPA.

In view of the foregoing remarks and amendments to the claims, the applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account No. 19-0065.

The applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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LCF/la

Attachments: Request for Continued Examination  
Illustrative Figure Sheet  
Certificate of Accuracy  
Transperfect English translation of WO 2004/068101  
Declaration of Uwe Lehmann  
Declaration of Lars Birken